Review of chinook escapements and enumeration methods in Water Resource Inventory Area 8, Washington

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Objectives

- Enumerate naturally spawning chinook salmon (*Oncorhynchus tshawytscha*) in WRIA 8 streams

2. Document the timing and distribution of chinook spawning

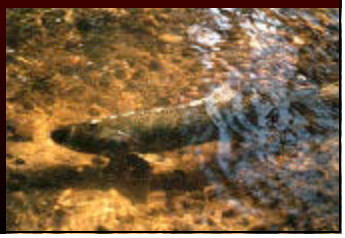
- Evaluate spawning success of female chinook using biological characteristics

Methods

- Live Counts = number of live chinook
- Carcass Counts = number of carcasses
- Redd Counts = number of chinook redds
- Biological survey = samples from chinook carcasses
  - Scales
  - Otoliths
  - Length (total fork length and post orbital-hypural length)
  - Percent spawned (females only)
  - Sex
  - Adipose fin (present/absent)
  - Coded wire tag (Bear Creek: 1998-99, 2002; Cedar River 2002)

Foot Surveys

- North Creek and Little Bear Creek Index Reaches
  - Live counts 1x/week
  - Redd counts 1x/week
- Big Bear and Cottage Lake Creeks
  - Live counts 1x/week
  - Redd counts 1x/week (2x/week during peak spawning)
- Cedar River tributaries
  - Live counts/redd counts 1x/week
- Issaquah Creek
  - Carcass counts of natural spawners



Float Surveys

Cedar River Mainstem

Live Counts 1x/week

Redd Counts 2x/week (separate effort led by SPU)

Calculating Escapement

- Area Under the Curve
- Redd Counts
- Carcass Counts

Area Under the Curve (AUC)

AUC = S Fish Days/Stream life

Fish Days = average of two consecutive live counts divided by the time between the two surveys

Stream life = the number of days a fish can be counted by surveyors, for WRIA 8 it is assumed to be 10 days

Calculating Escapement

- Area Under the Curve
- Redd Counts
- Carcass Counts

Redd Counts

Escapement = Total # of redds * 2.5 adults/redd

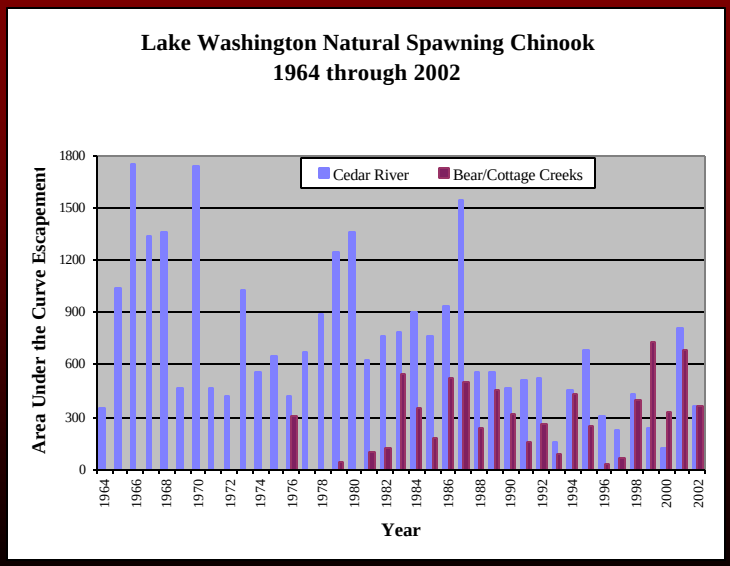
Calculating Escapement

- Area Under the Curve
- Redd Counts
- Carcass Counts

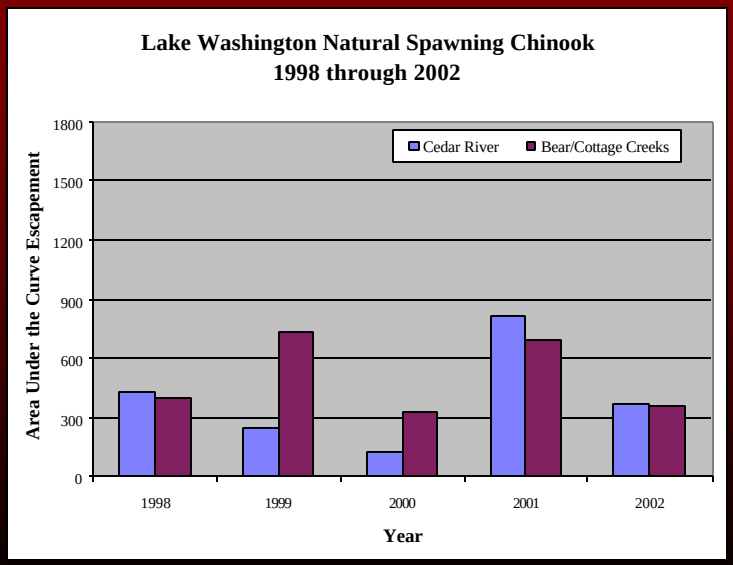
Carcass Counts

Escapement = S of carcasses + the number of live fish during the last survey

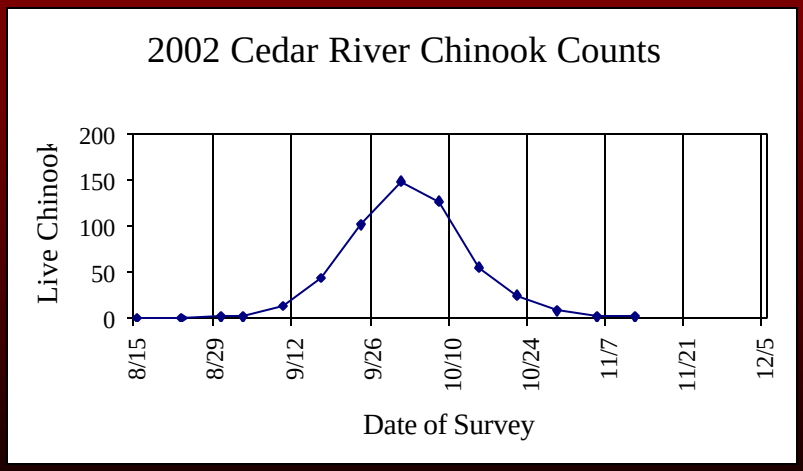
Results



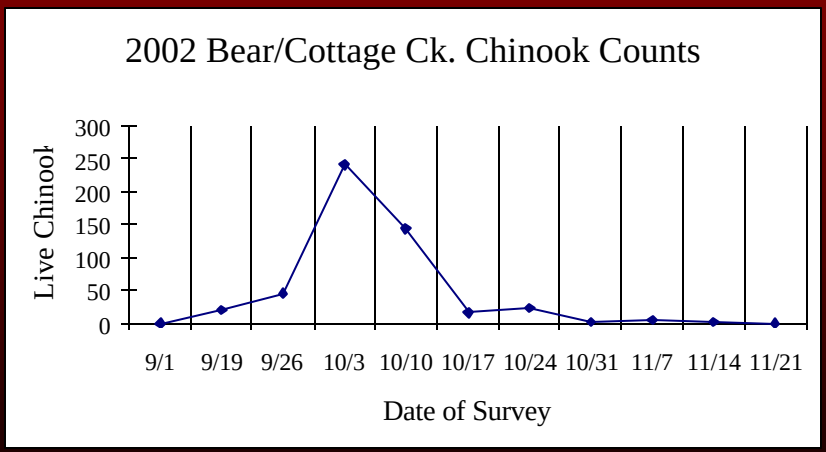
Results



Results: Cedar River 2002



Results: Bear/Cottage Creeks 2002



Results: Survey Streams 2002*

Stream	AUC	Redds	Carcasses	Escapement Est.
Taylor Ck	18	10		25
North Ck	18.3	10		25
Little Bear Ck	9.3	3		8
Issaquah Ck			1118	1118
Bear/Cottage	360	125		360
Cedar River	369	266		369

*Other streams surveyed in 2002 did not contain spawning chinook

Discussion

- Area Under the Curve
  - +'s: Consistent with historical counts, little training required, capture data for multiple species
  - -'s: Dependent upon water clarity, stream life assumption, doesn't differentiate between females and males, doesn't account for pre-spawning mortality, start and end points
- Redd Counts
  - +'s: Specificity with production, spatial and temporal distribution, includes pre-spawning mortality
  - -'s: Time consuming, observer bias, difficult when other species are present, not comparable with historical data
- Carcass Counts
  - +'s: Inexpensive, little training required, repeatable
  - -'s: Can be inaccurate, flow dependent,pre-spawning mortality

Conclusions

- Several different methods are used to estimate spawning ground escapement, each with their own set of strengths and weaknesses
- Ideally, escapement would be measured as the number of eggs in the gravel

Future Work

- Funding secured through 2003
- Comparison between AUC and alternative methods for escapement
- Marked capture/recapture studies to test sensitivity of methods
- Continued biological sampling for age, sex ratios, and spawning success
- Now that hatchery fish are marked, spawning ground surveys can aid in a better understanding of the complex interactions between hatchery and wild chinook

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If you're interested in helping or expanding surveys, please contact:

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